Validation of a Cumulative Substance Use Biomarker Improves Methamphetamine Use Detection in PWH

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BACKGROUND

- Methamphetamine (MA) use predicts poor HIV outcomes and despite the unrelenting addiction crisis, **objective assessment of MA use is insufficient** - no accepted objective standard detection of long-term MA use.
- **Objective: validate hair as an objective, long-term biomarker of MA use** (as has been established in ART adherence) in people at risk of or living with HIV (PWH)
- Quantitative hair measurement will allow detection of reduced use, an emerging goal in addiction management
- Hypothesis: cumulative assessment of hair MA in PWH **who report at least weekly MA use but have negative urine MA tests will increase detection of MA use.**

METHODS

- Using liquid chromatography tandem mass spectrometry-based analytical methods to measure past-month MA use, we examined mSTUDY samples (well-established cohort of MSM that collected self-reported substance use data using validated tool (ASSIST), urine and hair specimens).
- Per Society of Hair Testing guidelines, hair was MA-positive if concentration was >200 picograms/mg.
- Sensitivity: proportion of positive hair samples from MSM who reported at least weekly use, despite negative urine tests. Specificity: randomly selected n=22 hair samples from controls who reported no MA use and where urine testing was negative for substances, including MA.

Can hair effectively detect past-month MA use in PWH reporting regular MA use but with negative urine tests?

Small-volume hair analysis doubled objective detection of last-month methamphetamine use: **likelihood ratio of positive hair methamphetamine** (not detected in urine) **was 6.0** (95% CI: 2.1-17.3).

RESULTS

- Demographics: 33/44 (75%) living with HIV with 55% VL>50 in +MA self report group; 50% Latinx; 20% Black
- Of n=22 who reported daily or weekly MA use but had negative urine tests, 3 (14%) reported daily use & 19 (86%) reported weekly use.
- Hair analysis detected MA use > established threshold in 17 individuals, sensitivity of 77% (95% CI 60-95%).
- Among the 22 controls with no reported MA use & negative urine MA testing, 3 had MA-positive hair samples, with a specificity of 85% (95% CI 72-100%).

CONCLUSIONS

- This novel biomarker of analyzing MA use in hair samples identified twice as many individuals with past-month MA use than the urine MA test captured (20 additional individuals of 44 tested).
- Sensitivity/specificity of hair tests are likely an underestimate given self-report is imperfect.
- Our analysis underscores the potential **advantage of hair-based assays in capturing long-term MA use**

NEXT STEPS

- Quantitative assay to objectively detect reduced MA use.
- Validate multianalyte panel to study polysubstance use.

