2430

Detectable HIV RNA in late pregnancy associated with low tenofovir hair levels at birth

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Background

- Adherence to antiretroviral therapy (ART) is vital to prevention of mother-to-child transmission of HIV (PMTCT) and maternal health, although peripartum life events can disrupt adherence.
- Hair levels measure cumulative ART exposure and are associated with viral suppression in nonpregnant and postnatal populations.
- We evaluated correlates of peripartum tenofovir (TFV) exposure using hair measures among women living with HIV (WLHIV) in the United States.

Methods

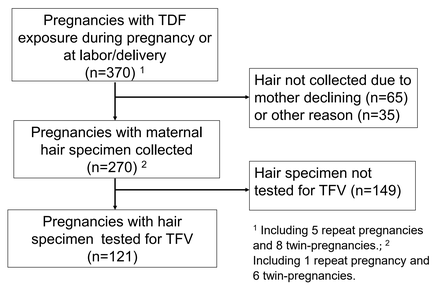
- Hair samples were collected at or shortly after childbirth among WLHIV enrolled in the Surveillance Monitoring for ART Toxicities Study of the Pediatric HIV/AIDS Cohort Study (PHACS) between 6/2014-7/2016.
- Among those on TFV disoproxil fumarate (TDF)-based regimens during pregnancy, TFV hair levels analyzed using validated liquid chromatography/ tandem mass spectrometry method in the UCSF Hair Analytical Laboratory (HAL).
- Weight-normalized TFV hair concentrations were log10 transformed.
- Correlates of TFV hair levels were identified using multivariable linear regression; covariates with p<0.25 in univariable models were included in multivariable models.

Figure 1. Hair collection process



Viremia among WLHIV during late pregnancy was strongly associated with lower maternal TFV hair levels at birth. TFV hair levels in this population suggest lower than expected peripartum ART exposure, though viremia in late pregnancy was rare (9%).

Figure 2. Flow diagram of SMARTT sub-study participants with TFV exposure from 6/2014-7/2016



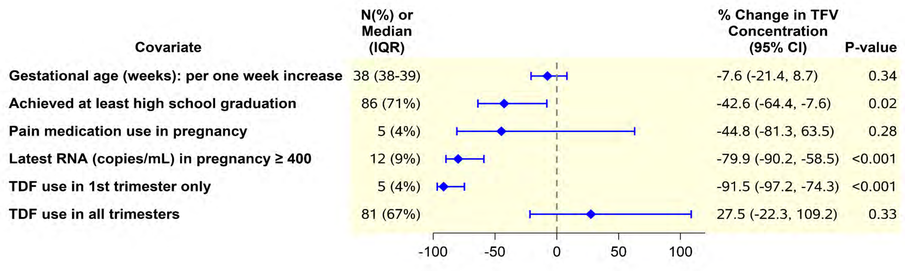
[1] Including 5 repeat pregnancies and 8 twin-pregnancies.; [2] Including 1 repeat pregnancy and 6 twin-pregnancies.

Table 1. Participant characteristics (n=121)

Characteristic	% or Median (IQR)
Maternal age (years)	31 (26-36)
Achieved high school graduation	71%
Recreational drug use in pregnancy	12%
Race/Ethnicity	
Non-Hispanic Black	71%
Hispanic	21%
Non-Hispanic White/Other	7%
Time since birth at hair collection (days)	3 (1-14)
TFV hair levels ≥0.038 [1]	28%

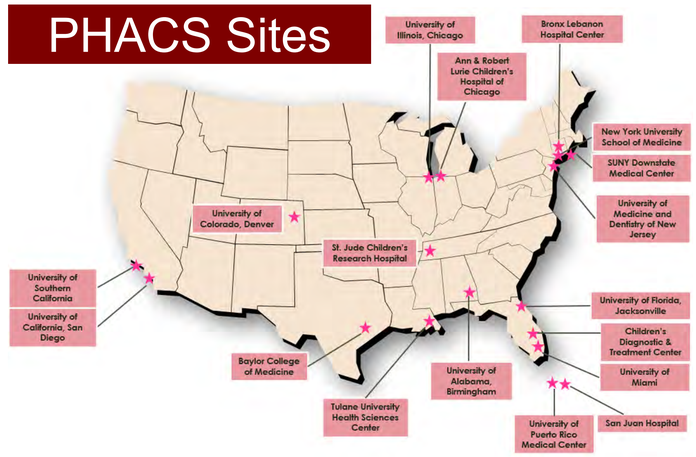
TFV=tenofovir; [1] Equivalent to 7 doses/week in directly observed therapy studies among non-pregnant women (Koss et al *AIDS* 2018)

Figure 3: Adjusted associations of covariates with log TFV concentration (n=121)



TFV=tenofovir; ART=antiretroviral therapy; INSTI=Integrase Strand Transfer Inhibitor; RNA=ribonucleic acid; TDF=tenofovir disoproxil fumarate
1 Estimated percent change in TFV concentration: 1) per one unit increase in continuous covariate measures; or 2) between pregnancies with a specific characteristic vs the reference group for categorical covariate measures.
Covariates with p-value < 0.25 in univariable analysis were included in the multivariable model.

PHACS Sites



Conclusions

- Unsuppressed VL among WLHIV in the U.S. during late pregnancy, a critical period for PMTCT, was strongly associated with lower maternal TFV hair levels at birth.
- TFV hair concentrations in this population suggest lower than expected peripartum ART exposure, although viremia in late pregnancy was rare (9%).
- Lower peripartum hair levels could be due to inadequate adherence or pharmacokinetic variability in pregnancy.
- Efforts to improve PMTCT outcomes could incorporate drug exposure monitoring and include adherence promotion strategies unique to the peripartum period.

Acknowledgments

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