Linxuan Wu[1], Peter Anderson[2], Monica Gandhi[3], Grace John-Stewart[1], John Kinuthia[1,4], Felix Otieno[4], Pascal Omondi[4], Ben Ochieng[4], Mary Marwa Motongori[4], Lauren Gomez[1], Julia Dettinger[1], Jared M. Baeten[1,5], Jillian Pintye[1]

[1] University of Washington, Seattle, WA, USA [2] University of Colorado, Aurora, CO [3] University of California, San Francisco, San Francisco, CA, USA [4] Kenyatta National Hospital, Nairobi, Kenya. [5] JMB is an employee of Gilead Sciences, outside of the present work

BACKGROUND

- Lower tenofovir (TFV) & TFV metabolite (such as TFV-diphosphate) concentrations are observed in plasma and dried blood spots (DBS) during pregnancy compared to non-pregnant periods.
- Hair TFV levels measure long-term exposure, which may be less affected by physiologic changes during pregnancy that can influence blood-based measures.
- To date, TFV and metabolite levels have not been compared in hair and DBS among women taking PrEP during pregnancy and the postpartum period

METHODS

Study design: The PrIMA Study (NCT03070600) evaluates PrEP delivery strategies for pregnant women who were followed 9-months postpartum.

Sample collection: Hair and DBS samples were collected at visits from a subset of women who reported using PrEP in the last 30 days.

Measurement: PrEP drug levels were measured using liquid chromatography/tandem mass spectrometry.
  - Hair reflecting PrEP use over weeks to months
  - DBS reflecting PrEP use in the last 4-8 weeks

Analysis: Correlations between TFV hair levels and TFV-DP DBS levels were calculated via Spearman coefficient. Median hair TFV levels were calculated based on DBS benchmarks for dosing in pregnancy/postpartum from IMPAACT 2009 and hair benchmarks in non-pregnant women.

Figure1. PrEP adherence thresholds in DBS for pregnancy and postpartum from the IMPAACT 2009 study

Hair metrics measuring long term PrEP exposure may not need adjustment for PK differences in the perinatal period

RESULTS

- 34 hair-DBS paired samples were evaluated; 12 (35%) from pregnancy visits at a median of 32 weeks gestation and 22 (65%) from postpartum visits at a median of 3.5 months since birth
- Median time since PrEP initiation was 18 weeks (IQR 7-33) at sample collection.

Table1. TFV hair levels among women enrolled in the PrIMA Study during pregnancy and postpartum, by dosing benchmarks established in DBS and hair

Pregnancy status	PrEP benchmarks (doses/week)	Based on DBS benchmarks [1]		Based on hair TFV benchmarks [2]	
		No. of hair samples	TFV hair levels (ng/mg)	No. of hair samples	TFV hair levels (ng/mg)
Overall	<2	19	0.000 (0-0.006)	20	0.000 (0-0.006)
	2-7	15	0.035 (0.021-0.039)	14	0.035 (0.03-0.04)
Pregnant	<2	7	0.000 (0-0.005)	9	0.000 (0-0.006)
	2-7	5	0.029 (0.01-0.038)	3	0.038 (0.033-0.039)
Postpartum	<2	12	0.003 (0-0.007)	11	0.000 (0-0.006)
	2-7	10	0.035 (0.029-0.041)	11	0.035 (0.03-0.039)

[1] TFV hair levels were grouped into categories based on benchmarks in DBS from clinical dosing studies among pregnant and postpartum women in the IMPAACT 2009 (*Stranix-Chibanda* et al. 2021)
[2] TFV hair levels were grouped into categories based on benchmarks in hair from clinical dosing studies among non-pregnant women (*Liu* et al. 2014 and *Koss* et al. 2018) as benchmarks for pregnant women are unavailable

Based on DBS benchmarks, 44% of DBS samples had TFV-DP levels indicative of ≥2 doses/week; 41% of hair samples had TFV levels indicative of ≥2 doses/week based on benchmarks from non-pregnant women (Table1).

Figure2. Scatterplots and correlations between hair TFV and DBS TFV-DP levels in pregnancy/postpartum
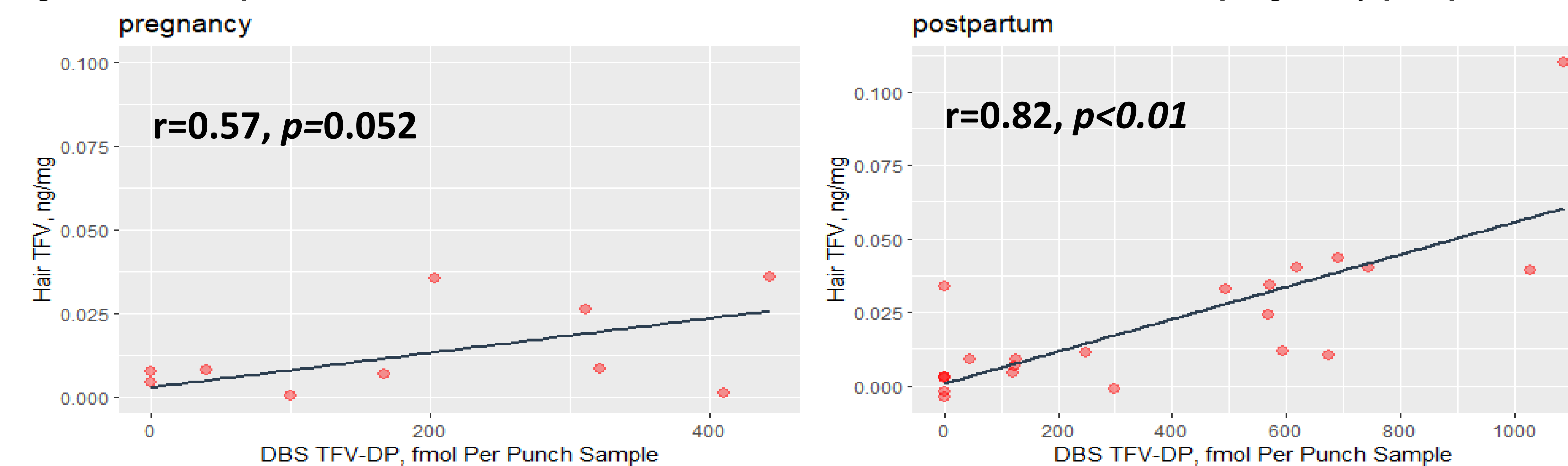
TFV levels in hair were strongly correlated with TFV-DP levels in DBS (r=0.77, p<0.001), with stronger correlation postpartum (r=0.82, p<0.001) compared to pregnancy (r=0.57, p=0.05) (Figure2).

Figure 3. Scatterplot and correlation between hair TFV and DBS TFV-DP levels in pregnancy and postpartum
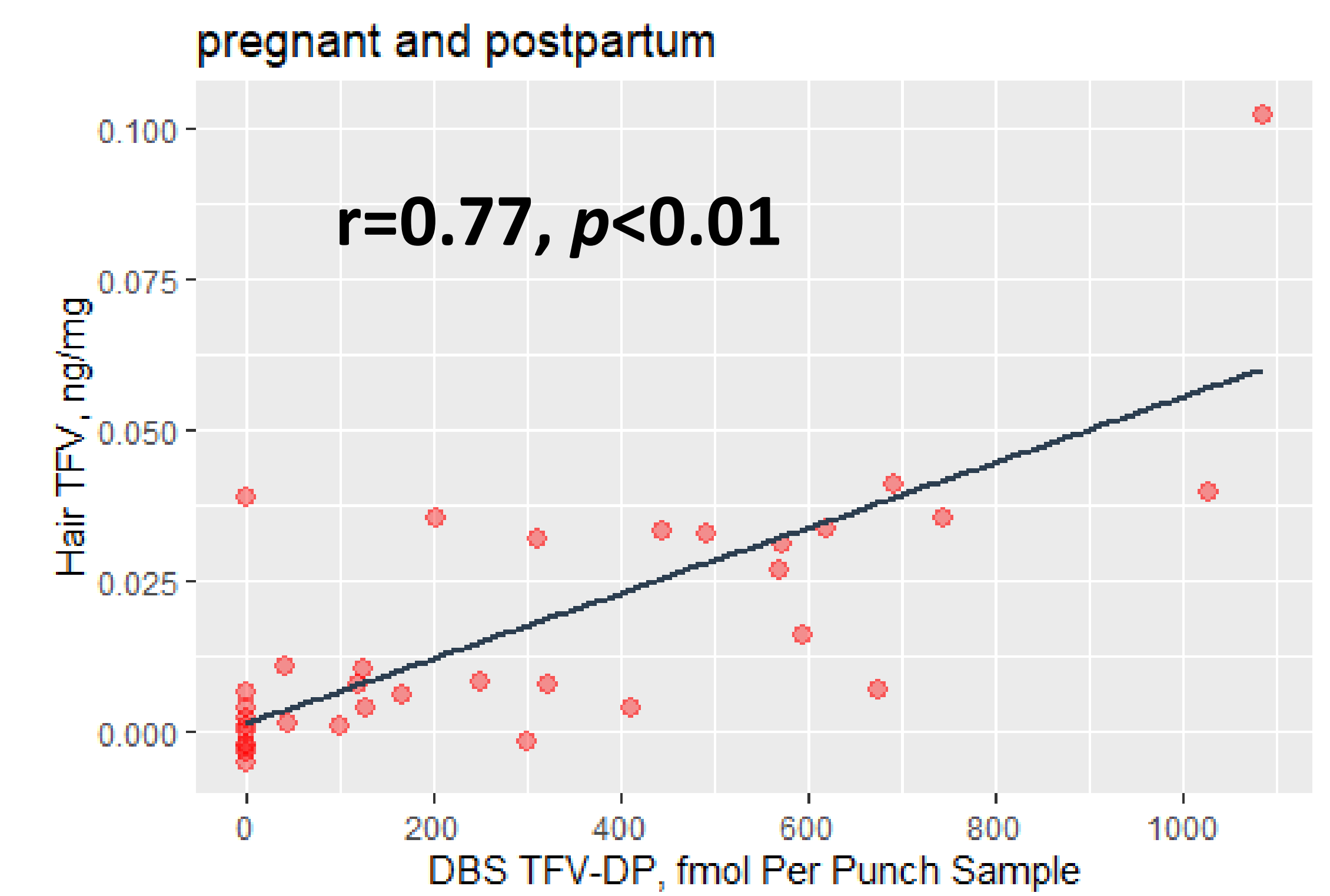
CONCLUSIONS

- Our findings suggest that hair PrEP measures are strongly correlated with DBS metrics, but may not need adjustment for PK differences over the perinatal period when used as adherence metrics like DBS
- These data suggest an advantage of using hair measures for PrEP adherence during pregnancy and postpartum over blood-based measures, which are more influenced by physiologic changes during pregnancy.
- Our results should be considered with caution given the small sample size.

ACKNOWLEDGEMENTS