Agreement between HbA1c and interstitial glucose in people living with HIV

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BACKGROUND

- Studies suggest diabetes is more common in people living with HIV (PLWH)
- HIV clinical guidelines recommend screening for diabetes in adults on antiretroviral therapy (ART).
- There is no agreed screening method for diabetes in PLWH
- HbA1c has been reported to be falsely low in PLWH but study participants were taking older preparations of ART that are rarely used today.
- Continuous glucose monitors (CGM) report interstitial glucose and can explore HbA1c-glucose discrepancy, but has not been used in PLWH.

AIM

- To investigate the agreement between HbA1c and interstitial glucose using CGM, according to HIV serostatus in two cohorts, Brighton, UK and Lusaka, Zambia.

METHODS

- PLWH and age-and sex-matched HIV negative participants were purposely recruited from clinics in Lusaka and Brighton.
- Participants in Brighton were excluded if known to have conditions to influence HbA1c.
- Participants in Lusaka were excluded if they had a diagnosis of type 2 diabetes (T2DM).
- Each participant wore a Dexcom G6 CGM for up to 10 days and had a paired HbA1c measured
- HbA1c was measured by point of care Alere Afinion A2 analyser (Lusaka) or the Roche immunoassay (Brighton)

ANALYSIS

- Bland-Altman plot was used to assess the agreement between HbA1c and glucose management indicator (GMI).
- GMI is a CGM derived surrogate HbA1c.
- Least squares linear regression was performed on data from the Brighton study to assess the influence of HIV serostatus on HbA1c, with additional predictor variables that had previously reported to influence HbA1c. Due to the different methods for HbA1c, Zambia data were not included within this analysis.

SUMMARY OF PARTICIPANTS IN THE BRIGHTON AND LUSAKA STUDY

	Brighton (UK) study		Lusaka (Zambia) study	
	HIV+ n-60[B]	HIV- n-48	HIV+ n-21[L]	HIV- n-30
Mean age (years) (±SD)	57(10.7)	56.7(8.9)	39(9)	40(10)
Male(%)	90	92	33.3	30
Mean HbA1c (±SD) (mmol/mol)	48.2(12.8)	44.5(13.6)	35.5(4.3)	37.5(5.2)
Mean CGM glucose (±SD) (mmol/mol)	8.2(2.6)	7.2(1.9)	6.1(0.7)	6.5(0.9)

Brighton – 98% on ART, 100% undetectable viral load
Lusaka – 100% on ART, 81% undetectable viral load



Dexcom G6 CGM sensor and transmitter

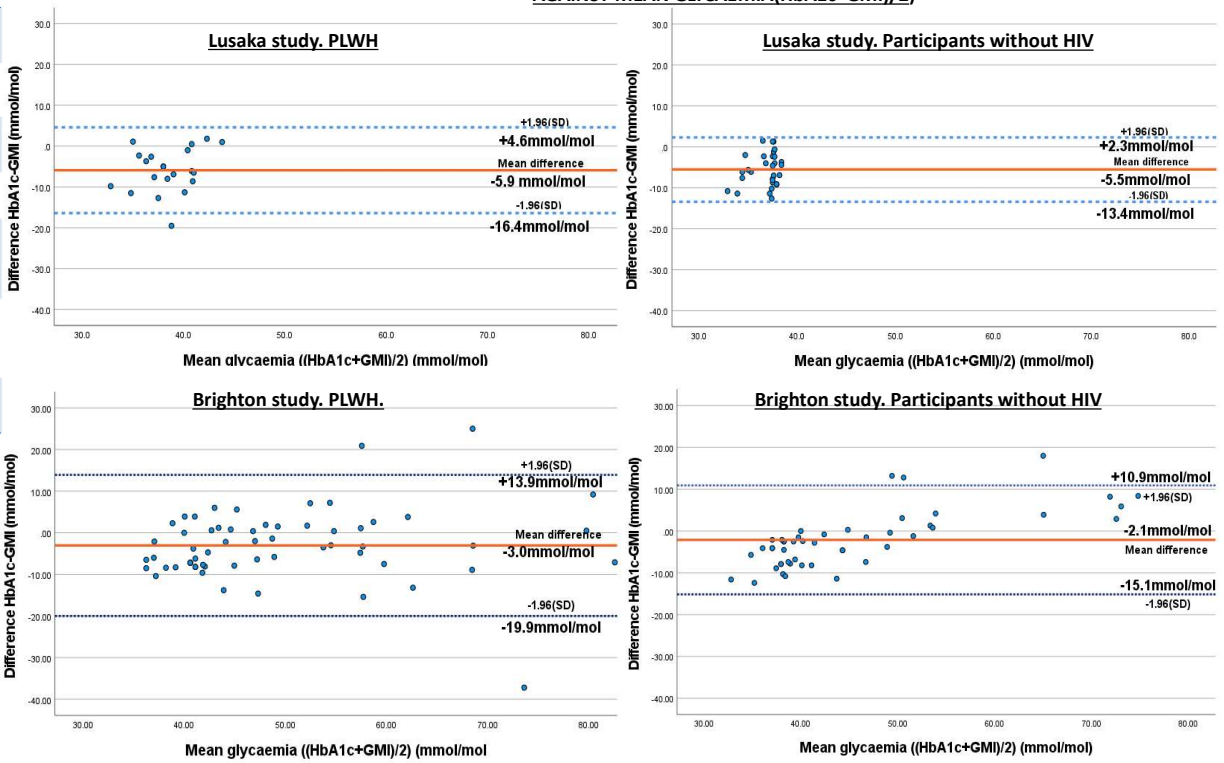


Dexcom receiver

LINEAR REGRESSION MODEL BRIGHTON STUDY HBA1C VS PREDICTOR VARIABLES

Predictor variable	Co-efficient	95%CI	p-value
(Constant)	31.319	-2.480-65.177	0.069
CGM glucose	4.970	4.223-5.717	<0.001
HIV	**-1.269**	**-4.341-1.803**	**0.414**
BMI	0.317	0.087-0.546	0.007
Haemoglobin	0.017	-0.123-0.157	0.809
MCV	-0.325	-0.634- -0.015	0.040
Reticulocyte count	-0.085	-0.151- -0.019	0.012
Age	0.039	-0.121–0.199	0.632

BLAND ALTMAN PLOTS. DIFFERENCE BETWEEN MARKERS OF GLYCAEMIA (HbA1c-GMI) PLOTTED AGAINST MEAN GLYCAEMIA(HbA1c+GMI)/2)



In two cohorts from UK and Zambia we found no evidence for a difference in agreement between HbA1c and interstitial glucose according to HIV serostatus.

CONCLUSIONS

- Bland-Altman - The mean difference between HbA1c-GMI by HIV serostatus was 0.91mmol/mol (Brighton) and 0.4mmol/mol (Zambia). This is not a clinically significant difference.
- The 95% limits in agreement are wide, with ranges containing 0, suggesting no significant difference based on HIV serostatus.
- Regression analysis using the data from the Brighton study found that **HIV serostatus did not influence HbA1c**.

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