Personalized A1C enhances clinical decision making by improving agreement between A1C and GMI

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Disclosure

Ramzi A. Ajjan reports Institutional Research Grants: Abbott Diabetes Care, Bayer, Eli Lilly and NovoNordisk. Honoraria/education support/Consultant: Abbott Diabetes Care, AstraZeneca, Bayer, Boehringer Ingelheim, Bristol-Myers Squibb, Eli Lilly, GlaxoSmithKline, Menarini Pharmaceuticals, Merck Sharp & Dohme and NovoNordisk.

This research was funded by Abbott.

Introduction

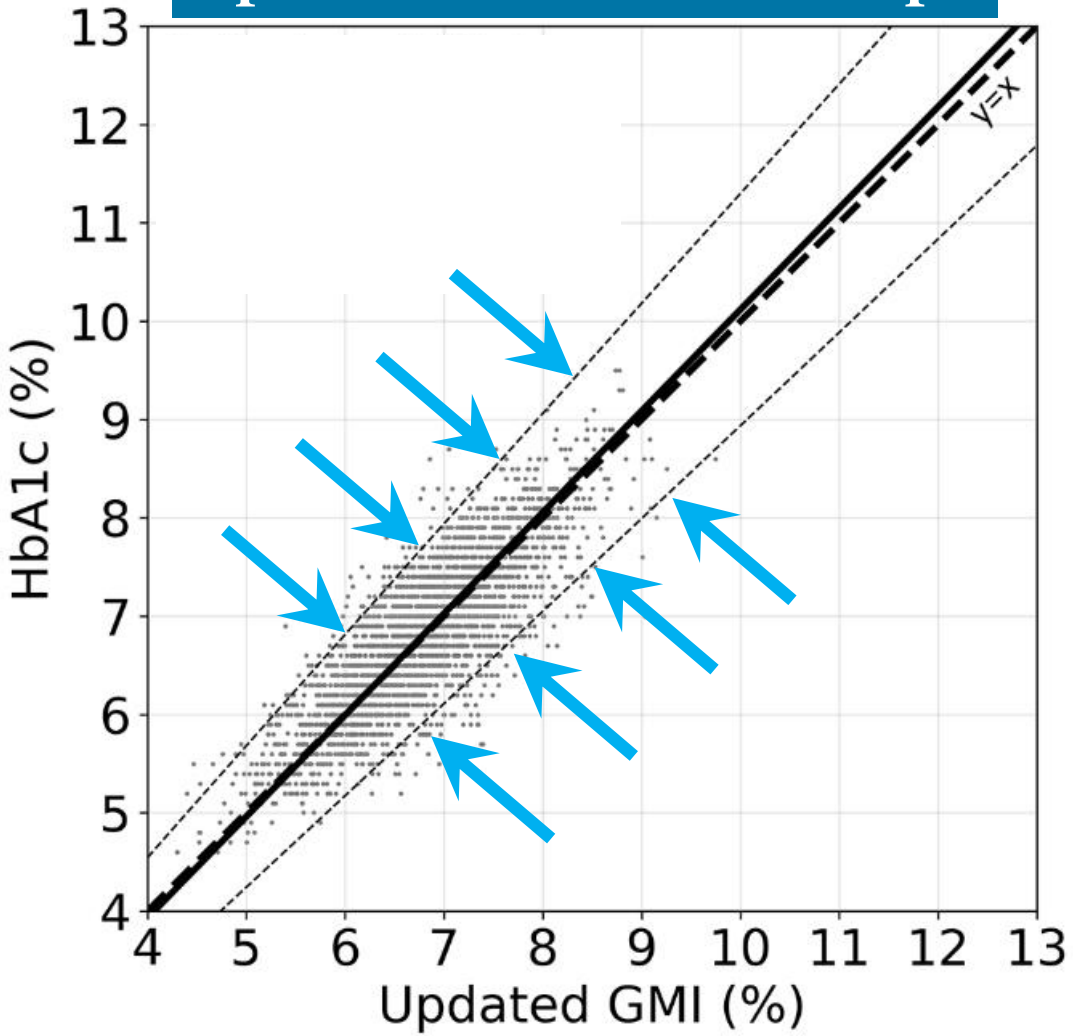
- GMI is an important CGM derived metric for glycemic management and clinical decision-making
  - It was intended to reflect average glucose in HbA1c unit

- Due to personal RBC factors, GMI and HbA1c can show discordance, potentially leading to management difficulties

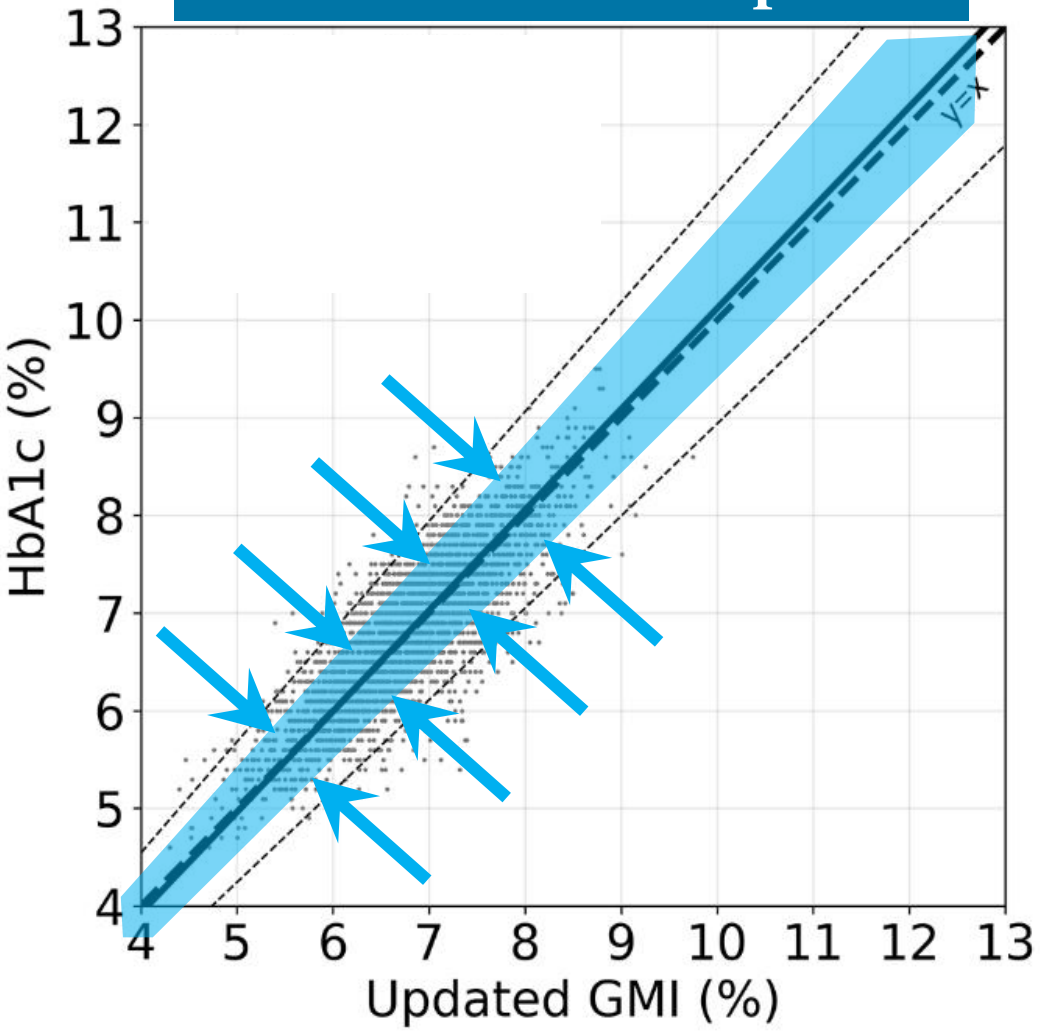
- Discordance is mainly related to:
  - Deviated slope due to GMI calculation method (higher GMI than HbA1c at lower glucose readings and vice versa)
  - Large spread of data due to inter-individual variation in RBC physiology

GMI-HbA1c discordance

Updated GMI fixed the slope



How to fix the data spread?



Aims

Tighten the correlation between GMI and HbA1c by accounting for individual variability in RBC physiology, the personalized glycation ratio (PGR)

Validation datasets used include

1. GDAC study: Purpose-built study.
2. Real-world: Observational study to further confirm validity.

Study populations

GDAC Study

NCT05189938

- A prospective 6-month US-UK study (18 centers) in individuals aged 4 years or older with T1D or T2D and including different racial groups
- CGM was used continuously for 6 months and HbA1c sampled every two weeks (venous blood for older individuals and point of care for the younger age groups)

Real world Study

- Linked real-world deidentified data from
  - LibreView data management platform (Abbott Diabetes Care, Alameda, USA)
  - medical and pharmacy claims data
  - a large reference laboratory A1C dataset
- 18,186 individuals with diabetes
  - 55% T1D, 37% T2D, 8% gestational/other
  - Mean age 60 years (±14 years, 6-89)
  - 58% female

Personalized HbA1c (pA1C)

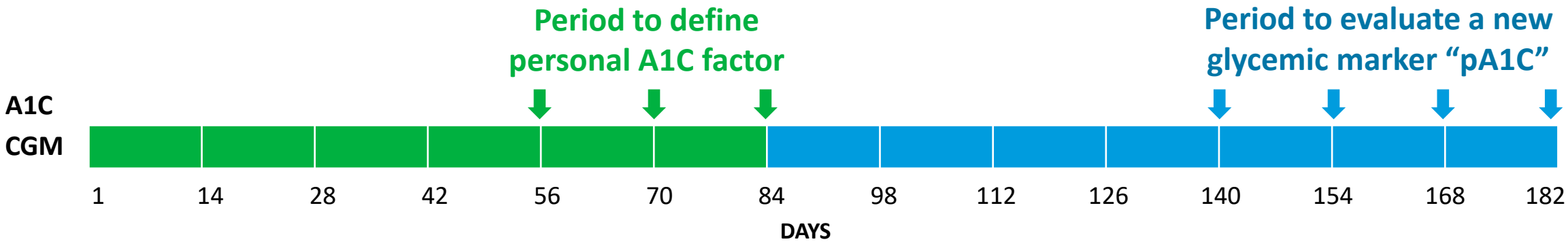
- HbA1c and CGM data were evaluated for up to week 12 to determine PGR
- Individual PGR was applied to calculate personally adjusted HbA1c (pA1C)[1] at weeks 20-26
- HbA1c and pA1C were then assessed for agreement with average glucose in the prior 56 days

$$\mathrm{PGR} = \left(\mathrm{AG}^{-1} + \mathrm{K_M^{-1}}\right) * \left(100 * \mathrm{A1C}^{-1} - 1\right)^{-1} * 10^5$$

$$\mathrm{K_M} = 472$$

$$\mathrm{pA1C} = 100 * \left(1 + \frac{\mathrm{PGR}}{\mathrm{PGR}_{ref}}\left(\frac{100}{\mathrm{A1C}} - 1\right)\right)^{-1}$$

$$\mathrm{PGR_{ref}} = 65.1$$



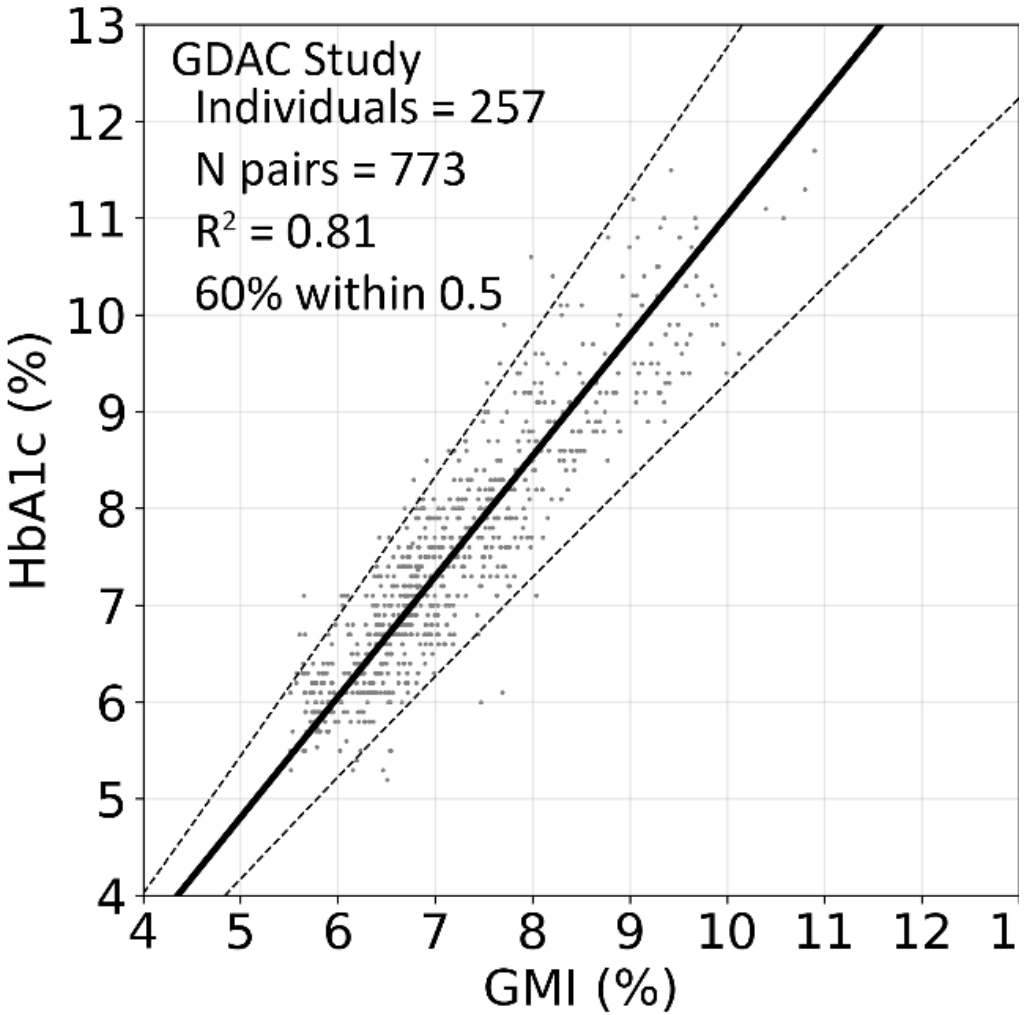
[1]Dunn TC, Xu Y, Bergenstal RM, Ogawa W, Ajjan RA. Diabetes Technol Ther. 2023 Jun;25(S3):S65-S74.

GDAC: Participant characteristics

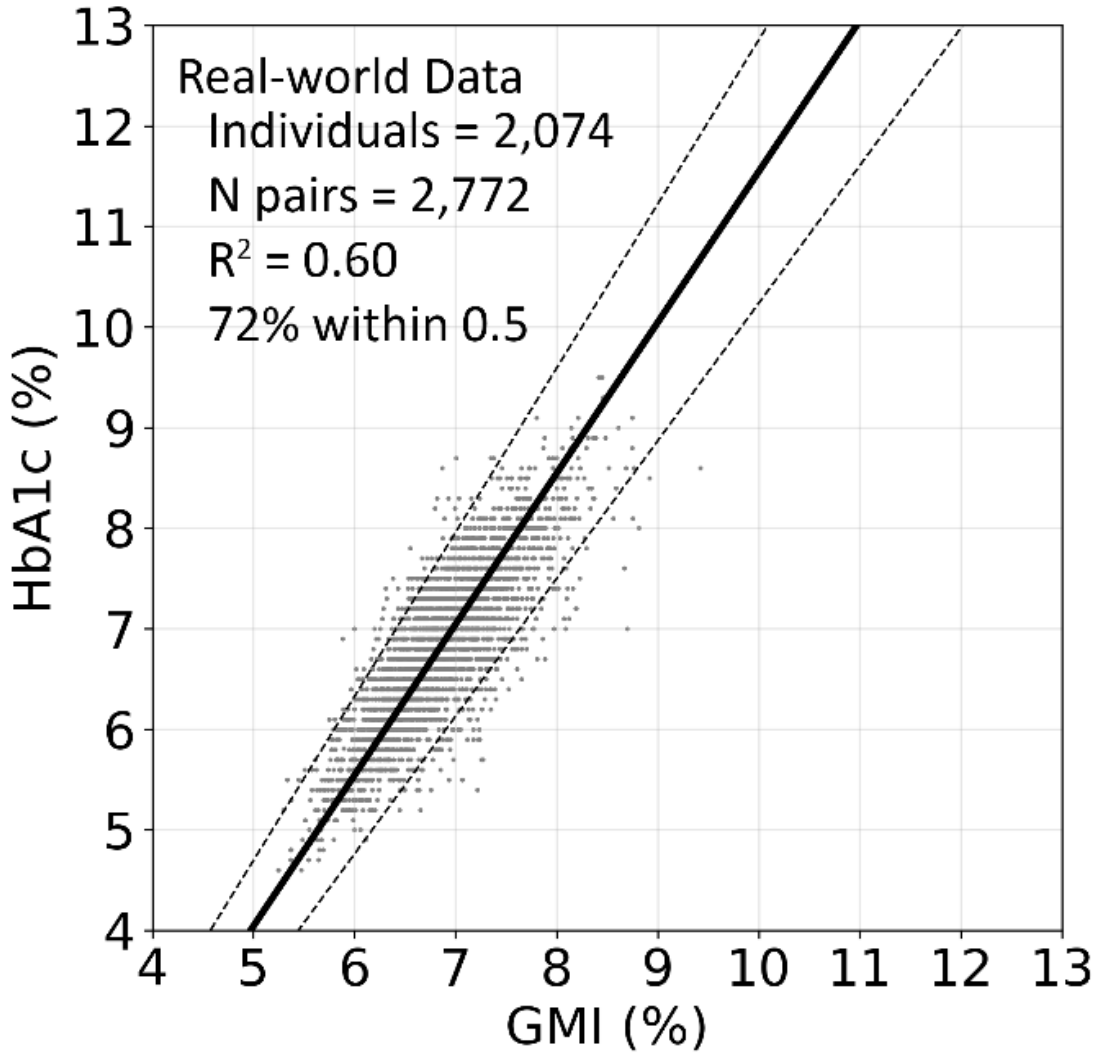
	Black	White	Asian	Other	Overall
Number	59	76	91	31	257
Adult/Pediatric	58/1	73/3	88/3	30/1	249/8
T2D/T1D	52/7	49/27	77/14	25/6	203/54
Female	36 (61%)	31 (41%)	33 (36%)	15 (48%)	115 (45%)
Age (years)	54 (14)	51 (18)	51 (16)	52 (13)	52 (16)
A1C %	7.7 (1.3)	7.5 (1.0)	7.8 (1.4)	7.1 (1.0)	7.6 (1.2)
Average Glucose mg/dL	153 (41)	164 (38)	168 (47)	153 (36)	161 (42)
Diabetes duration	13 (9)	16 (13)	15 (10)	13 (9)	15 (11)

Data are presented as Mean (SD) unless otherwise indicated.

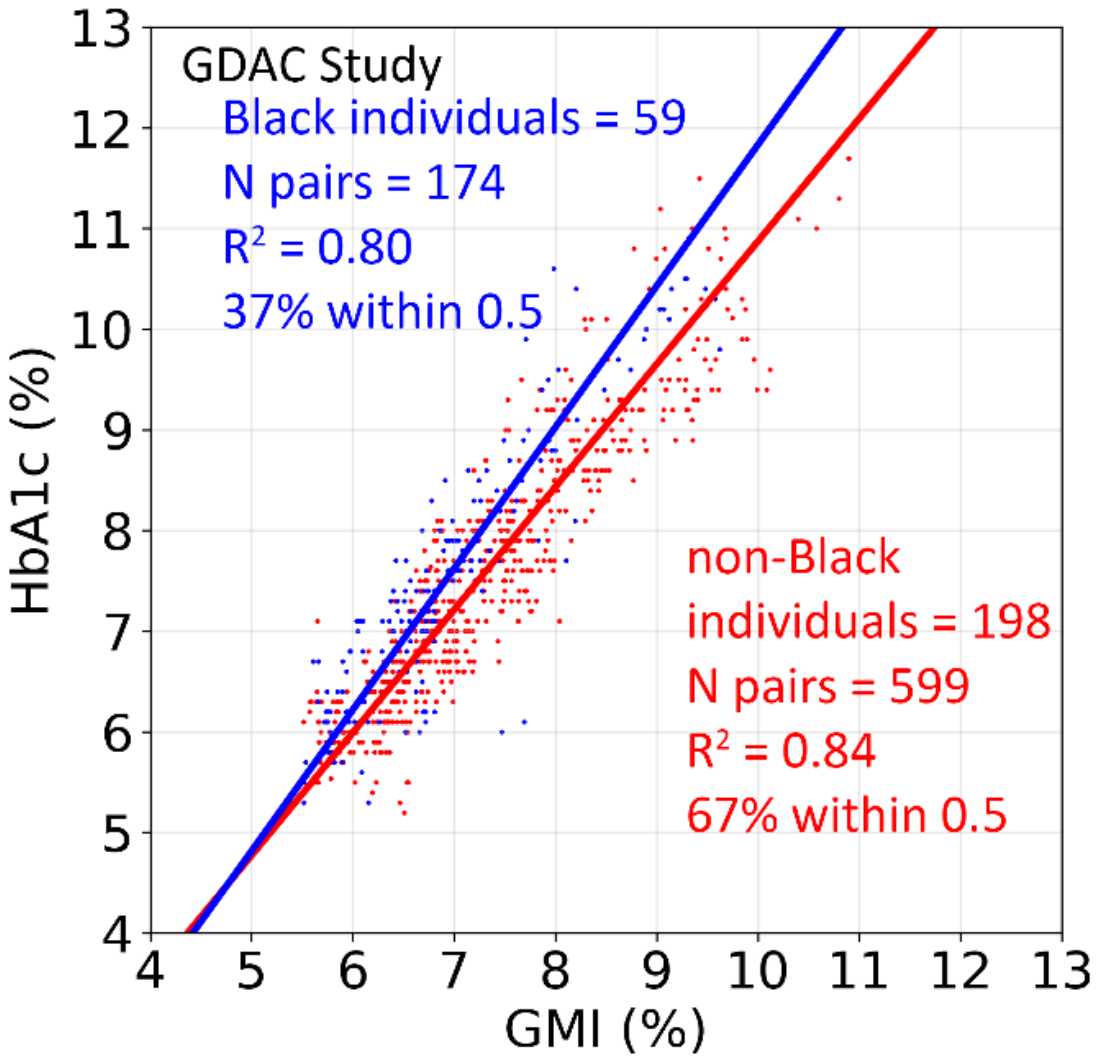
GDAC study: GMI and HbA1c correlation

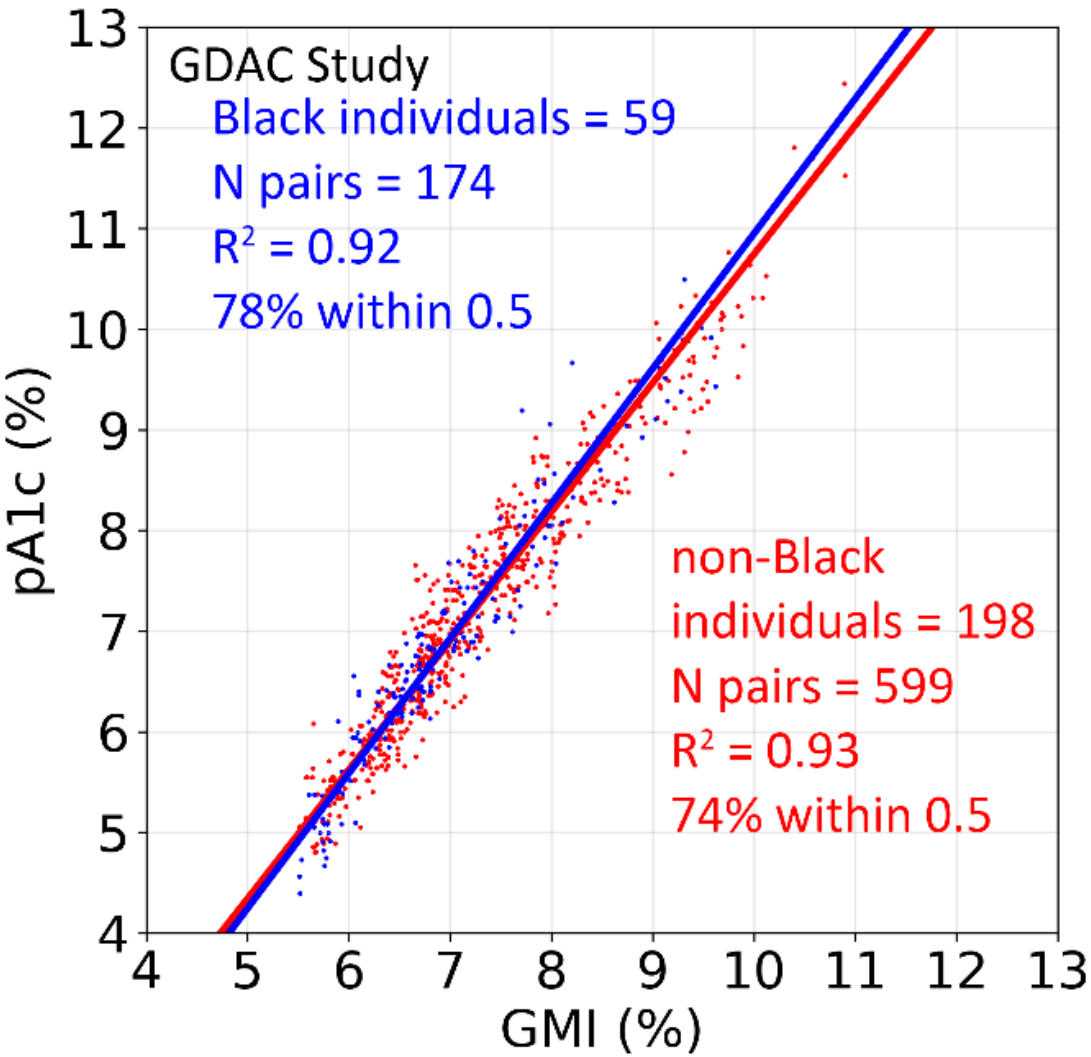


Real world study: GMI and HbA1c correlation

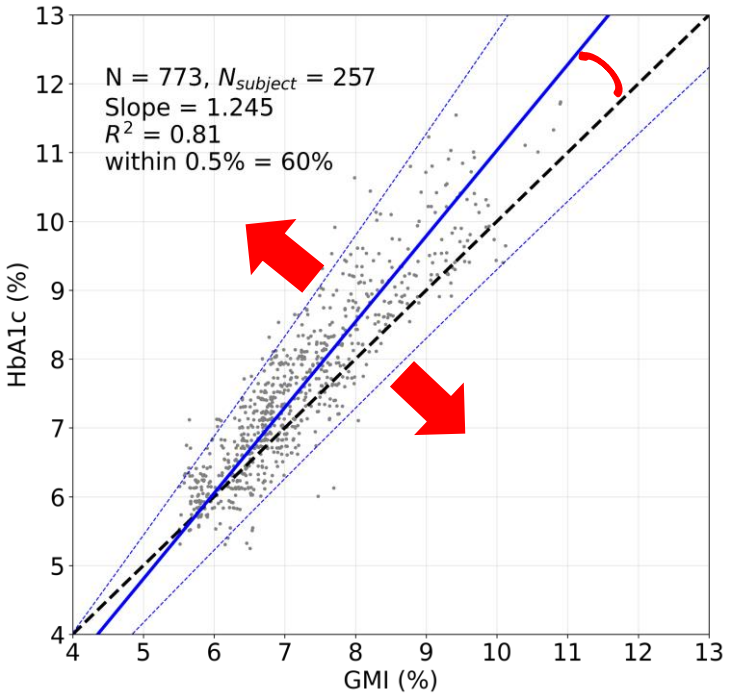


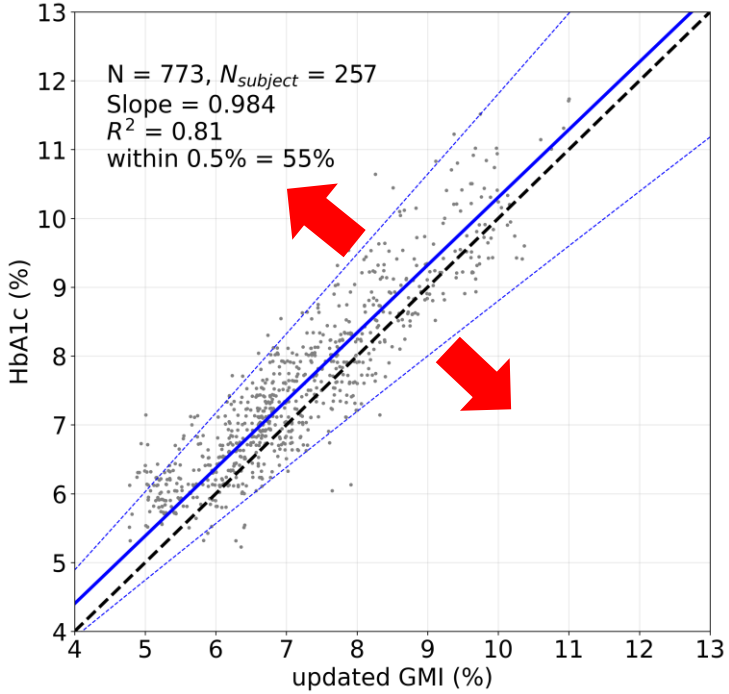
pA1c is even more effective at improving correlation in some racial groups

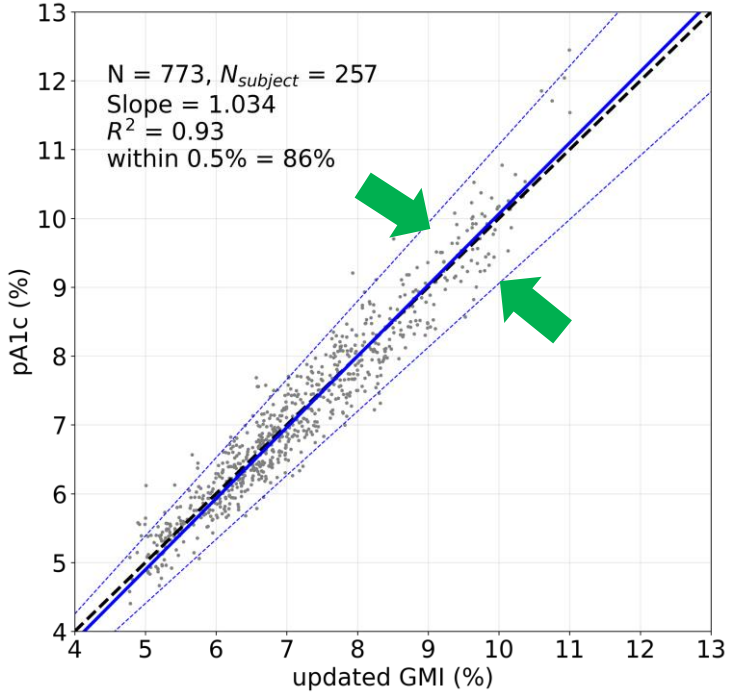




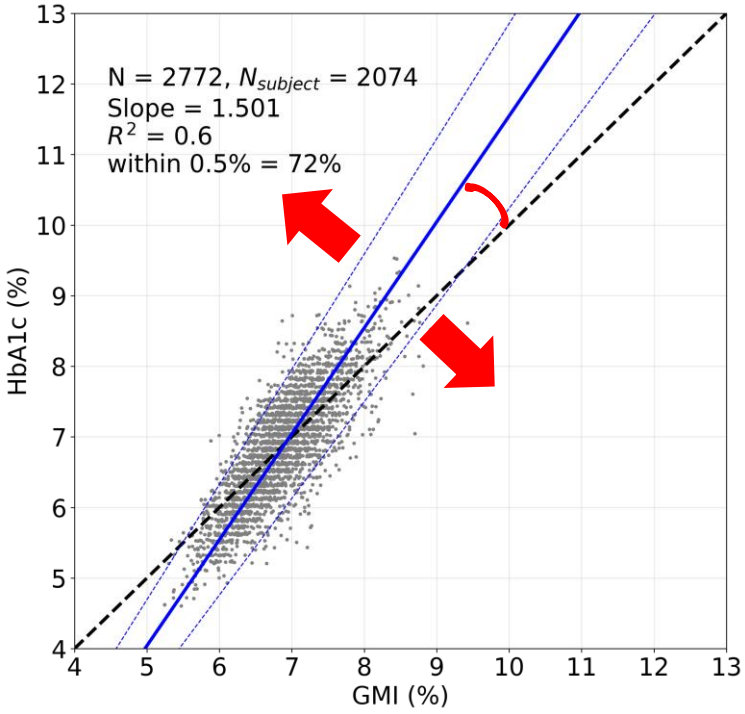
Discussion: Let's fix it all - updated GMI and pA1c (GDAC study)

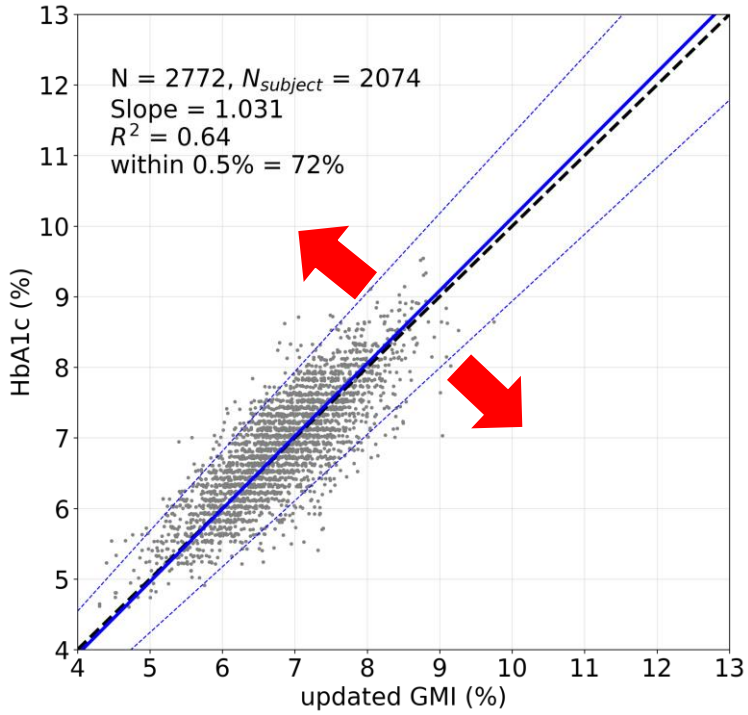


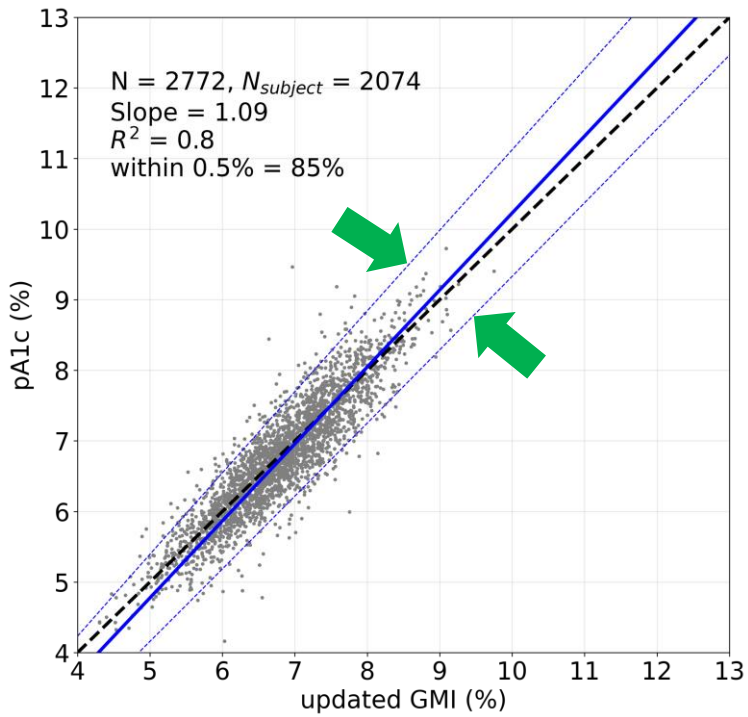




Discussion: Let's fix it all - updated GMI and pA1c (real-world study)







Conclusions

- Clinically significant discordance between laboratory A1C and GMI is not uncommon and can lead to management difficulties.
- Personalized A1C improves the correlation by accounting for inter-individual differences in red blood cell physiology.
- Use of updated GMI further improves the relationship, particularly at low and high glucose levels.
- Consideration should be given to replacing HbA1c with pA1c in individuals with diabetes who do not require uninterrupted CGM for their clinical management.

Thank you for your attention…

Abbott