Continuous glucose monitoring compared to biochemical markers for prediction of suboptimal outcomes in type 1 diabetes pregnancy: an ancillary study of the CONCEPTT clinical trial.

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on behalf of the CONCEPTT collaborative group

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Background

Type 1 diabetes (T1D) in pregnancy is associated with increased neonatal morbidity, which improves with optimal glycemic control.

Objective

We aimed to compare the ability of laboratory and continuous glucose monitoring (CGM) summary measures of glycemic control to predict neonatal outcomes in T1D pregnancy.

Methods

225 CONCEPTT participants had 6-day CGM and blood taken for glycemic marker analysis in 1st trimester, 24 and 34 weeks.

Lab Markers:

- HbA1c
- Fructosamine
- Glycated CD59 (gCD59)
- 1,5-anhydroglucitol (1,5AG)
- Glycated albumin (expressed as a % of total albumin)

CGM markers:

- Time in range 63-140 mg/dl
- Time above and below 140 mg/dl
- Glucose variability measures (Coefficient of variation (CV), std deviation (SD), Mean amplitude of glucose excursions (MAGE).

Pregnancy Outcomes: large for gestational age (LGA) using GROW and Intergrowth (IG) criteria, neonatal hypoglycaemia (NH) and neonatal intensive care unit (NICU) admission.

Statistical analysis: Unadjusted logistic regression

Figures 1-9: Predicting pregnancy outcomes using novel and established glycemic markers

Fig 1: Standardised Glycomark

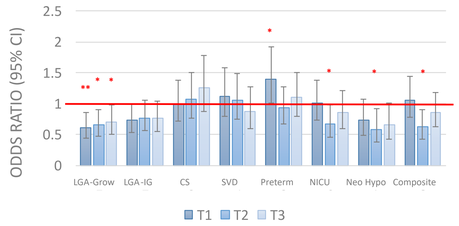


Fig 2: Standardised gCD59

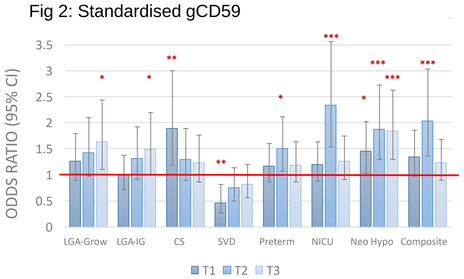


Fig 3: Standardised Glycated Albumin %

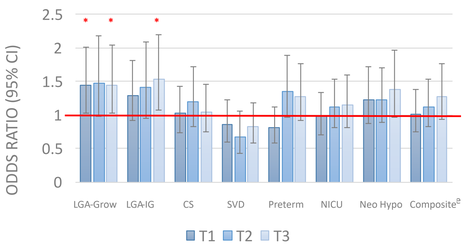


Fig 4: Standardised Fructosamine

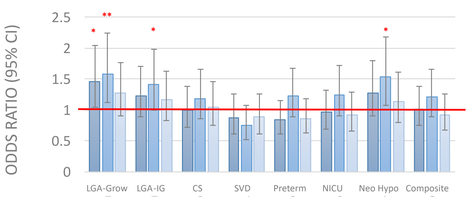


Fig 5: Standardised CGM Mean Glucose

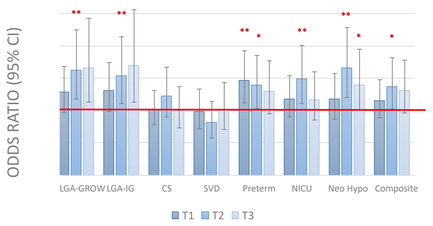


Fig 6: Standardised CGM Time in Range, 63-140 mg/dl

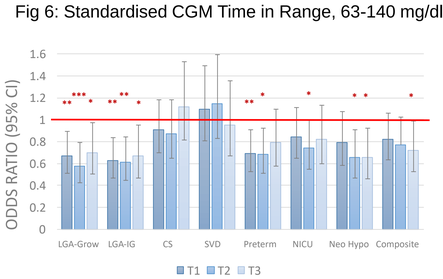


Fig 7: Standardised CGM Time Above 140 mg/dl

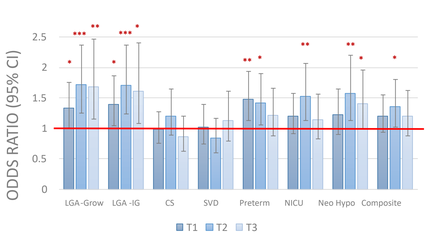
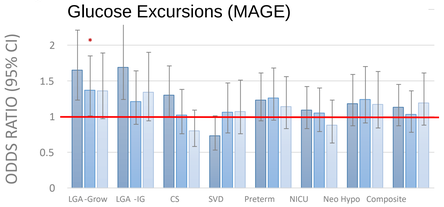
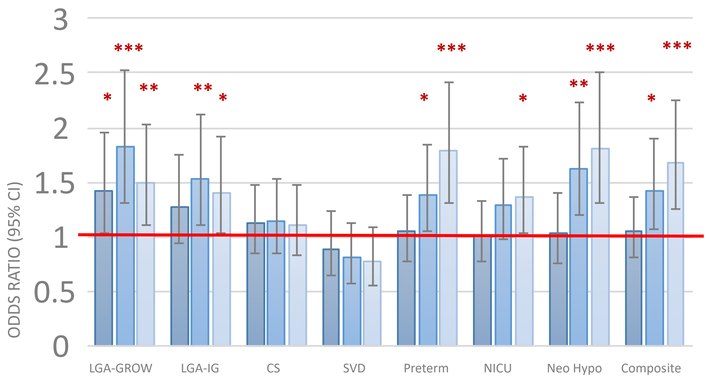


Fig 8: Standardised Mean Amplitude of Glucose Excursions (MAGE)



T1 T2 T3 Trimester of Pregnancy

Fig 9: Standardised HbA1c



Results (Figs 1-9)

- All glucose summary measures excluding CV predicted neonatal outcomes.
- Glycemic control at all time-points was important for LGA (associations present from 1st trimester), but emerged later for NH (24 & 34/52) and NICU (mainly 24/52).
- Both CGM time in target and average glucose and laboratory markers HbA1c, 1,5AG and gCD59 were able to predict all three outcomes studied.
- Time in range, time above 140mg/dl and mean glucose were the best CGM predictors.
- The best laboratory predictors were HbA1c, 1,5AG and gCD59.
- Lab and CGM measures were both able to identify pregnancies at risk of perinatal complications.

Conclusion

In women with T1DM, both CGM and laboratory glucose summary measures are predictors of neonatal outcomes from 1st trimester.

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Acknowledgements: The CONCEPTt study was funded by the JDRF, Canadian Clinical Trials Network and NIHR UK. This ancillary project was funded by the EFSD/Sanofi European Pilot Research Grants for Innovative Measurement of Diabetes Outcomes, 2017. CM is funded by the Diabetes UK Harry Keen Fellowship (17/0005712). Reagents for analysis of glycated albumin were kindly provided by Asahi Kasei Pharma Corporation through Spinreact. Reagents for 1,5 anhydroglucitol were kindly provided by Hirotaka Ishibashi at Glycomark Inc. Laboratory analysis for these analytes was performed in the NIHR CBAL in Cambridge Biomedical Research Campus, UK. Reagents and laboratory analysis for gCD59 were kindly provided by Prof Jose Halperin.