The haemoglobin glycation index is reproducible in dysglycaemic individual but is not explained by post-challenge plasma glucose levels

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Background and aims: The haemoglobin glycation index (HGI) measures whether a subject's HbA_{1c} is higher or lower than typical for their fasting plasma glucose (FPG). We used Early Diabetes Intervention Trial (EDIT) data to determine whether HGI values are reproducible and whether differences relate to two-hour post-challenge plasma glucose levels (2HPG).
Materials and methods: HbA_{1c} and 75g OGTT data were available at baseline and at three years on 271 of 631 EDIT subjects recruited with two FPG levels 5.5-7.7 mmol/L inclusive two weeks apart. Using 1985 WHO criteria, 100 (36.9%) had normal glucose tolerance (NGT), 22 (8.1%) had isolated impaired fasting glucose (IFG), 69 (25.5%) had isolated impaired glucose tolerance (IGT), 38 (14.0%) had both IFG and IGT and 42 (15.5%) had diabetes. HGI was defined as the 'residual' from a linear regression model of HbA_{1c} on FPG *i.e.* an individual's HGI is their actual HbA_{1c} minus that predicted from their FPG by a linear regression model. Subject's 0 and 3-year HGI values were compared and regression model used to determine whether HGI values are explained by 2HPG, age, sex, race, body mass index, HDL cholesterol, systolic blood pressure, fasting plasma insulin and smoking status.
Results: 0 and 3-year HGI values were correlated (Spearman's $r=0.61$, $p<.0001$). In a multivariate mode for 3-year HGI values, only 0-year HGI, age and 2HPG were significant at the 5% level. All other variables had p-values > 0.1 except Indian Asian ethnicity ($p=0.073$). Age and 2HPG together had a R^2 statistic of 0.088, indicating that these variables explain less than 9% of the variation in HGI.
Conclusions: Dysglycaemic individuals have highly reproducible intra-subject HGI values with inter-subject differences that are not explained by 2HPG levels.