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Clinical Value of HbA1c/$_{updated}$GMI Ratio in Identifying Early Retinopathy Risk in Type 1 Diabetes

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Abstract

Background: Discrepancies between HbA1c and glucose management indicator (GMI) may reflect individual variations in glycation rate, independent of mean glycemia, and could influence complication risk stratification in type 1 diabetes (T1D). We evaluated the phenotype of individuals with T1D using continuous glucose monitoring (CGM), identified as high glycators based on HbA1c/$_{updated}$GMI ratio, and assessed retrospectively their risk of diabetic retinopathy (DR) and the time to DR diagnosis. The secondary aim was to identify clinical correlates of high glycation.

Primary outcome: time to first diagnosis of DR.

Secondary outcomes: clinical factors associated with high glycation.

Methods: A retrospective study of 411 individuals with T1D using CGM and concurrent HbA1c values. Patients with conditions affecting red blood cell (RBC) lifespan were excluded. Participants were divided into 3 subgroups based on current HbA1c/$_{updated}$GMI ratio ≤0.95 (low glycators), >0.95 and <1.05 (concordant glycators), and ≥1.05 (high glycators). Time to diagnosis of DR was retrieved.

Results: High glycation is associated with shorter time to first diagnosis of DR (adjusted hazard ratio 1.60). Non-HDL-C, RBC indices, and metformin were associated with high glycation.

Conclusion: Among individuals with T1D, an HbA1c/$_{updated}$GMI ratio ≥1.05 is associated with higher odds of DR. Non-HDL-C and RBC indices are correlates of high glycation. These results underscore the relevance of HbA1c and $_{updated}$GMI discrepancy in cardiometabolic risk assessment, but cutoffs remain to be set.

Keywords: HbA1c and GMI discordance; HbA1c/uGMI ratio; glycation gap; retinopathy; type 1 diabetes.

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