

## Personalizing nutrition interventions by predicting individual vulnerability to glucose excursions

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**Background:** Elevated postprandial blood glucose levels pose a global epidemic and are crucial in cardiometabolic disease management and prevention. A major challenge is inter-individual variability, which limits the effectiveness of population-wide nutrition interventions. To develop personalized interventions, it is critical to first predict a person's vulnerability to glucose excursions—defined here as elevated blood glucose levels—with minimal burden.

**Methods:** We examine the feasibility of personalized models, trained on past individual observations, to predict future glucose excursions in the daily lives of patients with type-2 diabetes (*M* age=61.5 years; 50% female; 2'595 postprandial glucose observations). Using meal and context-based features, we developed machine learning models employing low-burden (continuous glucose monitoring) or additional (high-burden manual meal tracking) approaches.

**Results:** Personalized models predicted postprandial glucose excursions (F1-score: *M*= 74%; median=78%). Some individuals were more predictable than others; and low-burden models performed better for those with more consistent meal patterns and healthier glycemetic profiles. Notably, no two individuals shared the same meal and context-based vulnerability predictors.

**Conclusions:** Findings can help personalize just-in-time-adaptive nutrition interventions to a person's unique vulnerability to glucose excursions, thereby helping improve type-2 diabetes management.

Self-declaration category: X Clinical

Status of first student: X student