

SIMPLIFIED ABSTRACT SAMPLE WORK

**Early Detection of β -Cell Decline Using Home Dried Blood
Spot C-Peptide Levels in New-Onset Type 1 Diabetes**

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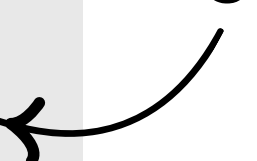
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Background

Type 1 diabetes (T1D) is characterized by progressive β -cell destruction leading to insulin deficiency. Early detection of β -cell decline is critical for monitoring disease progression and evaluating interventions aimed at preserving β -cell function.

The mixed-meal tolerance test (MMTT) is the current gold standard for assessing β -cell function through C-peptide measurement. While accurate, the MMTT is invasive, time-consuming, and requires patients to travel to clinical sites, limiting its feasibility for frequent monitoring.

specific background



knowledge gap

There is a lack of accessible, minimally invasive methods for longitudinal monitoring of β -cell function in newly diagnosed (ND) T1D patients. Home-based measurement techniques could address this gap, but their predictive validity against standard methods has not been fully established.

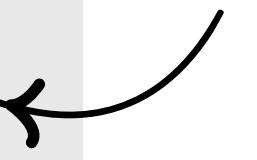
Here We Show

We evaluated the feasibility of using dried blood spot (DBS) C-peptide measurements collected at home to detect early β -cell decline and predict 12-month MMTT outcomes in ND T1D individuals.

Study Population: 292 ND T1D participants (mean age 12.7 years; range 1.2–43.8), recruited within 6 weeks of diagnosis as part of the INNODIA cohort. DBS Collection: Finger-prick DBS C-peptide samples were collected at home while fasting and 60 minutes after a liquid meal. Follow-up Assessment: At 12 months, venous C-peptide was measured via MMTT to calculate area under the curve (AUC) and peak C-peptide levels. Analysis: Slopes of DBS C-peptide over the first 6 months were analysed as predictors of 12-month MMTT outcomes, adjusting for glucose levels, age, and baseline fasting C-peptide.

Participants provided a median of 6.5 DBS card pairs over 12 months (IQR = 2–9). Stimulated DBS C-peptide slopes over the first 6 months significantly predicted 12-month MMTT AUC and peak C-peptide levels ($P < 0.01$). Fasting DBS C-peptide slopes did not predict MMTT outcomes.

Results & Interpretation



These results indicate that home-collected, stimulated DBS C-Peptide can serve as an early predictor of β -cell function. Home DBS C-peptide monitoring is a feasible, minimally invasive method for longitudinal assessment of β -cell function in ND T1D. Early stimulated DBS measurements could optimize clinical trial design by identifying patients at higher risk of rapid β -cell decline. Further validation is required to confirm reliability across diverse populations and settings.

Methods

Implications